Before the
**FEDERAL COMMUNICATIONS COMMISSION**
Washington, DC 20554

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| In the Matter of | ) | |
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| Use of Spectrum Bands Above 24 GHz For Mobile Radio Services | ) | GN Docket No. 14-177 |
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| Amendment of Parts 1, 22, 24, 27, 74, 80, 90, 95, and 101 To Establish Uniform License Renewal, Discontinuance of Operation, and Geographic Partitioning and Spectrum Disaggregation Rules and Policies for Certain Wireless Radio Services | ) | WT Docket No. 10-112 |

# JOINT REPLY COMMENT OF INTEL CORPORATION AND CISCO SYSTEMS, INC.

Dave Horne
INTEL CORPORATION
1155 F Street N.W.
Suite 1025
Washington, D.C., 20004

Mary L. Brown
John Graybeal
CISCO SYSTEMS, INC.
601 Pennsylvania Ave, N.W.
9th Floor North
Washington, D.C. 20004

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## I. Introduction and summary

Intel Corporation and Cisco Systems, Inc. ("Joint Commenters") respectfully submit this Reply Comment to the Commission's Third Further Notice of Proposed Rulemaking[1] on the use of spectrum bands above 24 GHz for mobile radio services. In our joint comment,[2] we noted how the established rules shape the sharing framework for Federal and non-Federal users in the Lower 37 GHz band. The joint comment proposed a streamlined, straightforward coordination approach to sharing the band, that would allow both for indoor as well as various outdoor uses, and by a broad set of potential parties, to include enterprises, service providers, government agencies, and others. In our view, this approach fills an important gap between exclusively licensed models and unlicensed models, and should contribute substantially to the development of *e.g.* industrial automation and the Internet of Things (IoT). Our reply comment further elaborates on the proposal.[3]

The simplest sharing mechanism that can support band activities is the best. With that foundation, we recommended using the successful 70/80 GHz framework as a baseline, but with modifications to account for the differences in the Lower 37 GHz band (such as the frequency coordination requirement and the use of site

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[1] *Use of Spectrum Bands Above 24 GHz For Mobile Radio Services*, Third Report and Order, Memorandum Opinion and Order, and Third Further Notice of Proposed Rulemaking, GN Docket No. 14-177, released June 8, 2018 (hereinafter "Third R&O" or "Third FNPRM" as applicable).

[2] Third FNPRM Joint Comment of Intel Corporation and Cisco Systems, Inc. Key Commission decisions made to date are: (1) Federal and non-Federal users will share co-equally, and are co-primary, with no secondary users currently allocated in the band; (2) non-Federal users will share the spectrum on a non-exclusive basis; (3) licensees are required to register their individual access points and base stations under a site licensing regime, and are required to frequency-coordinate.

[3] The Notice also states that non-Federal users are licensed-by-rule. Typically, the Commission has elected to use license-by-rule in bands where individual licensing of transmitters would be an unjustifiable burden, and where no interference protection is provided and frequency coordination is not deemed necessary. Essentially, license-by-rule is used in cases where a general or blanket operating permit is sufficient for services in a band. Since those conditions are contradicted by other rules and by the operating environment for this band, we are unclear what purpose license-by-rule would serve, or was intended to serve, in the Lower 37 GHz band. If the Commission has an atypical intention for the need for license-by-rule in this band, it should clarify what specifically it uniquely enables, and that is complementary to the other rules and conditions in this band. Absent that, the Commission should state that license-by-rule is not applicable in the Lower 37 GHz band.

licenses). We noted that the record of Orders in the 70/80 GHz proceeding provides an effective and detailed template for expeditiously creating rules for the Lower 37 GHz band. We also proposed two categories of licenses (General Site (GS) and Property Zone (PZ)) defined by polygons). The polygons establish the coexistence reference boundary between adjacent networks. We noted that the PZ license would be suitable for enterprise uses such as industrial automation and IoT private networks requiring a level of certainty in the control and management of the spectrum that cannot be attained by using unlicensed or GAA[4] spectrum. We also noted that in many cases, PZ networks would be indoor-use only, and this could both greatly simplify coordination efforts and enable robust spectrum re-use. Finally, we recommended that licensees be required to accommodate subsequent license applicants when feasible.

Fourteen parties filed comments addressing, to varying degrees, the 37-37.6 GHz (Lower 37 GHz) band. A number of parties agree with our position that the sharing framework should be as simple and straightforward as possible. For example, TIA recommends the sharing framework "should be implemented using the simplest means necessary to enable Federal and non-Federal shared use of the bands"[5] while AT&T recommends "the sharing procedure should be minimal and not unduly burdened with complexity,"[6] and WISPA recommends the Commission "adopt a simple coordination mechanism that is founded on existing coordination schemes."[7]

Several parties support our view that a complex, dynamic sharing framework is not justifiable for this band.[8] However, even among the parties who recommend consideration of a dynamic sharing framework,

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[4] GAA, or General Authorized Access, is the name given to the lowest (third) tier in the 3550-3700 MHz CBRS band. It has no interference protection rights, and must not cause interference to higher-tier users.

[5] TIA Third FNPRM comment at 3.

[6] AT&T Third FNPRM comment at 7.

[7] WISPA Third FNPRM comment at 3.

[8] *See e.g.* Third FNPRM comments of CTIA at 3, TIA at 3, Ericsson at 12.

several view it as a future consideration, not to be implemented from the start.[9] Collectively, this implies consensus among commenters to introduce services in this band via a simplified sharing framework, but a difference of opinion on whether a dynamic access framework is justifiable in the future.

Commenters also concur that Federal users should not be given blanket priority access. For example, Ericsson states that the Commission "should refrain from reserving part of the Lower 37 GHz band for Federal priority use",[10] with TIA adding that "granting special priority in any block of spectrum raises uncertainties for non-Federal licensees and may make deployments in this band less economical."[11] However, commenters also point out, and we agree, that certain Federal areas or facilities could be designated for dedicated Federal use without impacting non-Federal users. For example, WISPA suggests that the Commission could add to the existing list of protected military bases, providing they are outside population centers, but should do so up-front rather than on an ad hoc basis.[12]

In this reply comment we further explain our proposed license categories and the attributes of the licenses, we give example scenarios to clarify the license categories, and we recommend Commission actions. We also further discuss how the Commission and NTIA could essentially re-use the concepts developed for use in the 70/80 GHz sharing case. We explain a method by which the Property Zone (PZ) license category, could be further refined to enable a "fast track" path for well-isolated indoor-only PZ licenses, enabling the band to be put to use quickly. Finalizing the sharing rules for the other license categories will be a longer process, due to the

[9] *See e.g.* Third FNPRM comments of WISPA at 5, Starry at 20.
[10] Ericsson Third FNPRM comment at 12.
[11] TIA Third FNPRM comment at 5.
[12] WISPA Third FNPRM comment at 5. See also Third FNPRM comment of Ericsson at 13, AT&T at 11.

larger scope of coexistence considerations and deployment scenarios, but it can and should proceed in parallel with the fast track.

## II. Attributes of site licenses in the Lower 37 GHz band.

### *A. Rights associated with non-exclusive licensing in the band.*

Prior examples of non-exclusive licenses in various bands (the 3650-3700 MHz, historically, and the 70/80/90 GHz bands being relevant examples) characterize non-exclusivity in highly band-specific terms. In general, non-exclusive licensing in those bands begins with a requirement to first obtain a nationwide non-exclusive license, which serves as an eligibility umbrella for later registration of individual sites or links. An unlimited number of non-exclusive nationwide licenses can be issued in those bands. While this might be the appropriate two-step procedural framework for non-exclusive licenses in the Lower 37 GHz band, other variations of non-exclusive licenses are feasible, and in our view, more appropriate. For example, the Commission could choose to issue site licenses specifically encumbered by the rules applicable to the Lower 37 GHz band, without following a two-step process.[13] In that case, the non-exclusive license serves as an individual authorization, rather than a general authorization, and it includes interference protection rights and obligations, as well as frequency coordination requirements. In addition, it permits (on a location-dependent basis) limitations on the number of licenses so that fairness objectives and long-term sustainability of bandwidth per licensee can be maintained. We urge the Commission to clarify the model and associated rights and obligations

[13] *Compare* Europe's Electronic Communications Committee (ECC) Report 132, which utilizes the concept of Individual Authorizations that are encumbered by a requirement for frequency planning/coordination, and places limitations on the number of users. The ECC is a part of CEPT, the organization of European national regulators.

attached to the non-exclusive licenses in this band. This clarification is important since it affects the ability to finalize the steps in the license grant process implementation within the sharing framework.

### *B. Licensee Interference protection rights and obligations.*

Federal and non-Federal users are co-primary, co-equal, and must frequency-coordinate their site licenses. Non-Federal users are non-exclusive. We construe this collection of factors as entitling all users to interference protection rights relative to inbound harmful interference, as well as interference protection obligations relative to outbound harmful interference. Additionally, we have recommended the adoption of an accommodation rule as integral to the coordination requirements. The accommodation rule obligates all users to make good-faith efforts to accommodate next-in-time users to the extent feasible. Combined with PFD limits for PZ licensees, and Commission guidelines for relevant harmful interference measures for GS licensees, we believe this serves as a robust foundation for coexistence in this band, where existing and new users can count on a stable and sustainable interference environment. We urge the Commission to clarify the interference protection rights and obligations for users in this band. This is a necessary prerequisite for developing and finalizing the implementation details of the sharing framework and registration system.

### *C. Licensee usage rights among the six available 100 MHz channel blocks per location.*

Six 100 MHz blocks are available under the non-exclusive licensing regime in place for this band. Prospective licensees adjacent to an existing site license would be expected to engage directly with the existing licensee to resolve boundary disputes and interference concerns, at the time of license registration. Existing licensees must accommodate if feasible. In our comment, we noted the Commission may wish to inform the parties of its expectations for how bargaining should proceed. We believe these issues are best addressed as "Channel Block Sharing Guidelines" that exist alongside the accommodation rules, rather than as part of the Code of Federal Regulations. Due to the myriad deployment scenarios possible for this band, hard and fast rules

may lead to unintended consequences. As guidelines, however, the Commission is free to express its desire for equitable sharing, to the extent feasible. These guidelines would offer licensees a framework for their negotiations with other geographically proximate licensees, seeking to avoid an impasse or an accusation that the existing licensee is not fulfilling its duty to accommodate if feasible. Below, we offer a few scenarios and recommendations to illustrate the importance of guidelines.

### 1. One channel block guarantee, per licensee, per license area.

In the 2016 FNPRM, the Commission proposed to guarantee users in the Lower 37 GHz band a minimum of a single 100 MHz channel block.[14] We concur with the Commission's recommendation, which we refine further to state that any licensee in good standing should be guaranteed to retain no less than one 100 MHz channel block within the six available blocks in the band.

### 2. Unlike the 70/80 GHz band, first-in-time rights could have negative implications, particularly for GS licenses.

For GS licenses in particular, a hypothetical first-in-time licensee could block future applicants in a given geographic area if it could simply elect to use all or most of the available six channel blocks—in effect, creating an exclusive license. But since this band is non-exclusively licensed, and Federal and non-Federal users are co-equal and co-primary, and all users must frequency coordinate under accommodation rules, the sharing framework should prohibit exclusive GS use of the entire band in a specific location, in the face of multiple requests for spectrum. As discussed in the next section, additional guidelines are needed, since various permutations of overlapping licensees and/or channel blocks per licensee will occur in practice. Using those

[14] *Use of Spectrum Bands Above 24 GHz For Mobile Radio Services*, Report and Order and Further Notice of Proposed Rulemaking, GN Docket No. 14-177, released July 14, 2016, ¶454 (hereinafter "R&O" or "FNPRM" as applicable).

guidelines to address next-in-time licensees should allow resolution via private negotiations. The virtue of guidelines is that they are easily amended to provide direction to problems as they arise.

### 3. Under fairness guidelines, no licensee is guaranteed to retain multiple channel blocks once other licensees seek access at the same location.

Next-in-time licensees have equal rights to channel blocks, but there are limiting factors. We note that with a finite limit of six channel blocks available in any given location, and under our proposed accommodation rules and fairness guidelines, every licensee would enter into its registration with the understanding that the amount of spectrum it was granted in excess of a single block *could* be reduced as future licensees—each having the same right to use the spectrum—apply in the same geographic area.[15] A licensee's ability to use more than one block, up to six blocks, is location-dependent, based upon its ability to locate and size its network to maximize non-interfering, non-overlapping operations. One exception, as discussed in our comment, is the PZ licensee that shields its property emissions via compliance with a strict PFD requirement. As discussed above, we propose that a licensee in good standing should always retain at least one block, regardless of the number of future access requests.

We further note that while there are only six discrete 100 MHz blocks available in any given location, this does not necessarily imply a limit of six licensees assigned one block each. License polygons can be considered in 3-dimensions, and given the propagation and penetration characteristics in the band, this allows operations to be "stacked" in the vertical direction, either indoors or outside. For example, multiple point-to-point links might operate at a much higher height above ground than a ground-level network, with vertical separation potentially providing the interference protection. Therefore we do not recommend imposing a hard

[15] We note that if a PZ licensee has sufficient isolation to inbound and outbound interference, for example an indoor-only deployment where building losses are significant, it could gain access to the full band for its full license term with no coordination issues with future adjacent licensees.

limit (six, for example) on the number of frequency-coordinated licenses that can be issued in a given location. To that end, below we offer some scenarios where more than 6 licensees could coexist.

## 4. Scenarios where more than six licensees can geographically coexist while maintaining protection rights.

We make a distinction (based on millimeter wave deployment characteristics) between the 2-dimensional concept of a license *area*, and the 3-dimensional concept of a license *volume* (i.e. vertical extent within a given license area). For example, consider a large public park where, for example, three GS licensees (each assigned separate 200 MHz blocks, with internalized guard band, as needed) provide geographically overlapping and non-interfering mobile network coverage within the park, at ground level up to say 3 meters, while ten GS point-to-point links connect between multi-story buildings outside the park, but with signal paths overlapping the park at elevations well above the ground-level network. In this hypothetical scenario, 13 GS licensees could provide non-interfering service over the license area of the park, even though all their license areas overlap in 2-dimensions. These 13 licensees achieve non-interfering operation due to vertical separation in the license *volume* (*i.e.* license stacking); hence the license polygons can more generally be considered as 3-dimensional volumes at these frequencies, for coexistence determination purposes.

Alternatively, the Commission could permit the use of contention-based protocols, in some or all the channel blocks in this band, which would in theory permit greater than six non-pencil-beam licensees in a common geographic volume. This was essentially the approach the Commission took historically in the 3650-3700 MHz band. While not a contention-based protocol proposal, Qualcomm has proposed that a future 3GPP standard could be considered to enable radios to share frequencies at the same location, but emphasizes it is not seeking a technology mandate.[16] We believe such an alternative should not be foreclosed, and the market

[16] Qualcomm Third FNPRM comment at 8.

participants may choose this path, including in select geographic areas and/or in a limited number 100 MHz channel blocks, provided that coexistence can be demonstrated.

Still another alternative where more than six licensees could coexist in the same area is via Virtual Network Operators (VNO). VNO's are non-facilities-based providers who use capacity on a primary licensee's facilities-based network. Other sharing models are possible as well, and we believe these should be permitted so long as coexistence is preserved with other licensees.

## III. The 70/80 GHz sharing framework should be repurposed here.

In the joint comment, we noted the availability of the 70/80 GHz sharing rules, with some modifications *e.g.* to account for the use of site licenses and the frequency coordination requirement, would serve the Commission well in the Lower 37 GHz band. In 70/80 GHz, Commission-approved coordinators manage incoming registrations for licensees to determine if a prior link registration would suffer interference and to coordinate with NTIA to determine if the federal government believed its systems would suffer interference. Significantly, the query launched into NTIA from the commercial automated coordinators does not require NTIA to divulge any facts about federal operations. The NTIA simply returns a green light, meaning there are no issues, or a yellow light, which means the commercial registrant must select a new frequency or change its link geography. Moreover, the coordinators must themselves coordinate so that they share the same "ground truth" about the existing band operations.

Similarly, in the lower 37 GHz band, the Commission and NTIA could rely on an adaptation of the 70/80 GHz paradigm. The re-use and adaptation of this established baseline framework and associated processes should greatly simplify the development of the sharing framework for the Lower 37 GHz band. On the non-Federal side, there are a number of established band coordinators who would be candidates to perform these services for the lower 37 GHz band. The prospective licensee's technical showing to be provided to the

coordinators would, of course, need to be well defined to permit prompt decision-making and processing. Like 70/80 GHz, coordinators should also be able to advise prospective applicants about available channels. Moreover, if the Commission also allows the coordinators to perform the upfront technical showing on behalf prospective applicants, that business case could contribute to interest in becoming a band coordinator. On the Federal side, to the extent possible NTIA could reuse software it developed for 70/80 GHz for use in the lower 37 GHz, although a tighter integration with the non-Federal system may be advantageous.

In the lower 37 GHz band, we recommend site licenses defined by polygons as the basis for coordination, including point-to-point links as a permissible use case.[17] Compared to 70/80 GHz—which was limited to point-to-point pencil beam licensees--interference potentially could be a greater consideration in the Lower 37 GHz band's license approval process. Hence appropriate steps should be taken to keep the coordination task as simple as possible in light of the multiple network topologies that are permissible in this band. Such coordination must take place at the channel block level, considering interference relative to adjacent and overlapping site license polygons.

## IV. Property Zone (PZ) license considerations.

As discussed in our joint comment, a polygon representing the real property boundary is a viable site license definition for the Lower 37 GHz band. A key attribute of the PZ license stems from the fact that no other party can physically deploy network elements on the property without the property owner's permission, which limits the possibility of overlapping polygons (and therefore coordination challenges) compared to the GS license

[17] 47 CFR §30.204(b)(2) for fixed point-to-point operations is currently applicable to the 37-40 GHz range, and includes a 16 km coordination requirement. That rule was conceived of relative to the much large exclusive license areas in the 37.6-40 GHz range, and may need to be revisited relative to the smaller site licenses and different license categories and characteristics in this band. For example, due to their isolation, numerous PZ licenses within 16km of the point-to-point link are unlikely to be impacted and can be excluded from coordination.

category.[18] PZ licenses are applicable for both Federal and non-Federal users and would generally be associated with indoor use. Therefore they benefit from building structure attenuation (inside-out *and* outside-in) relative to adjacent GS and PZ licenses. Also, the PZ licensee will often benefit from additional losses due to outdoor clutter on the property (e.g. trees, secondary structures, block fences) and propagation path-loss due to the building wall offset from the property boundary. Finally, PZ license areas are defined by pre-existing legal property boundaries, in contrast to GS licenses which are *ad hoc*, user-defined license areas.

We are proposing that PZ licenses must—at the time of their registration—confirm the extent to which the license meets an outbound PFD requirement along the property boundary, and where the PFD limit represents emissions that are sufficiently low such that no adjacent licensee could reasonably claim harmful inbound interference. Thus, if a PZ license can meet this PFD limit along all its boundaries, it could receive an expedited grant since meeting this strict emissions limit would serve as a safe harbor against claims of future interference from less compliant neighboring sites.[19]

However, in light of RF network design choices or building structural and size variations relative to the property size[20], which in turn affects coexistence considerations with adjacent licensees, we note three

[18] Overlap into a PZ licensee's polygon license area is limited to cases where the PZ licensee authorizes the overlap, or the licenses overlap only as a 2-dimensional projection, but they have sufficient separation in the vertical direction when the three-dimensionality of the polygon is accounted for (*e.g.*, point-to-point links over the top of a building licensed as a PZ).

[19] As we noted in our original comment, the applicability of the PFD limit to GS licenses may warrant further investigation. We recognize the likely benefit from flexibility when evaluating the tradeoff between defined PFD limits and pure accommodation. While a PFD limit may be relevant for certain GS topologies, in general the GS licensees may need a greater degree of case-specific coordination of technical operating parameters with neighboring licensees to successfully address coordination.

[20] The use of an indoor network does not, in and of itself, guarantee interference immunity. This recognition is the motivation for the use of a PFD limit at the *property boundary* as the interference reference for PZ licenses. Attenuation due to different building materials at 37 GHz can vary widely, and buildings also differ in the number, size, and type of windows and doors along different license boundary segments, as well as the number of floors. Buildings also differ widely in their 2-dimensional footprint and in the offset distance between building walls and the nearest property boundary segment, as well as in the amount of clutter in that offset space. Finally, the design and layout of the indoor RF network can

scenarios relative to PZ licenses and PFD limit compliance: (1) the prospective PZ licensee meets the PFD requirement along the entirety of its boundary polygon; or, (2) it meets the PFD requirement along some but not all legs of the polygon; or, (3) it cannot meet the PFD requirement along any legs of the polygon. We discuss the considerations for those three scenarios below.

### *A. Prospective PZ licensee meets PFD requirement along the entirety of its property boundary.*

If a prospective PZ licensee complies with the PFD requirement *along its entire property boundary* (polygon), it meets the strictest outbound interference protection obligation for this band. This level of compliance (demonstrated at the time of license registration) would serve as a safe harbor against claims of harmful inbound interference made by neighboring licensees and can therefore result in expedited license approval. Furthermore, PZ licensees meeting this safe harbor could perhaps serve as the first wave of licenses granted in this band since the approval process would be significantly simplified compared to other license categories.[21] We believe many enterprise/industrial property owners could qualify for this fully compliant PZ license and the associated expedited license approval, but certainly not all.

The fully-compliant PZ licensee—since it meets the PFD requirement along its entire property boundary—would generally be able to use the full 600 MHz available in this band. Still, all licensees are encouraged to only apply for the channel blocks they will efficiently use. Note that since we are *not* recommending a separate PFD requirement in the vertical direction, it is possible a fully-compliant PZ licensee

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also be relevant. For example, some in-building networks may be deep inside the building interior, benefitting from multiple wall attenuation even in the presence of lower attenuation materials on the building's exterior walls.

[21] Coordination considerations for other license categories (particularly in cases of overlapping license polygons and outdoor use) are generally more involved, as described earlier.

might have to negotiate accommodations for a future GS licensee seeking to deploy (for example) a point-to-point link above and across its building.[22] As a general rule, if the PZ licensee took steps to protect its radio environment from outside-to-inside interference, such as operating its network well within a building, with multiple walls and ceilings between it and an adjacent GS or PZ license, or by virtue of RF-insulating materials applied to its structure, its use of the full 600 MHz need not be compromised. Thus the fully compliant PZ licensee's ability to use the full 600 MHz is entirely in its control, based on network design and supplemental isolation choices. Such is not the case for GS licenses since they must accommodate future users in the same location and would not generally benefit from building isolation.

### *B. Prospective PZ licensee meets PFD requirement along some, but not all, of its property boundary.*

In the case where a prospective PZ licensee meets the property boundary PFD requirement along *some, but not all*, of the polygon segments making up its property boundary, it is not eligible for fast-track treatment or full safe harbor treatment.[23] For example, this scenario could occur if the PZ applicant's building attenuation is too low e.g. due to large windows or doors on one side of the building, or the offset of its building is small along certain boundary segments, or it is operating an outdoor network on a portion of its property, near a boundary, but the emissions are significantly reduced by the building's attenuation on at least one of its property boundary segments.

A licensee applying for a partially-compliant PZ network should include a good faith estimate of the geographic outline of the expanded polygon area (*i.e.* indicating—on the violated legs of its polygon boundary—

[22] The accommodation rule should have the effect of ensuring that prospective licensees apply for only the number of channels that they need, since a lesser number would raise fewer potential coordination issues due to the future licensee being able to avoid co-channel operations.

[23] The specific qualifications and limiting conditions for this partially-compliant PZ license should be fleshed out via recommendations made in the comment record.

the expanded distance from its property line needed for its emissions to drop to compliant PFD levels). This is intended to aid future license applicants in adjacent areas, for coordination purposes.[24]

If there are no existing or pending PZ and/or GS licenses overlapping in these expanded polygon areas, the partially-compliant PZ applicant would have no party to negotiate with, and would be granted its PZ license with certain restrictions. For example, the applicant in this restricted PZ case might be limited to a subset of the available six channel blocks. Such restrictions could serve to encourage applicants to take extra steps such as additional building isolation materials or RF network design refinements so that they could obtain a fully compliant PZ license. The restricted PZ licensee has an obligation, at any point in the future, to negotiate with future license applicants, and is required to take steps to reduce its harmful emissions along its violated boundaries using various means (channel change, reduced bandwidth, additional isolation materials, reduced transmit power, etc.). This may mean it incurs unreimbursed expenses and/or a reduction from its initial bandwidth. The restricted PZ licensee would be required to acknowledge this potential outcome at the time of the license grant.

### *C. Prospective PZ licensee cannot meet the PFD requirement.*

If an applicant for a PZ license cannot meet the PFD requirement on *any* segments of its property boundary, it cannot be granted any PZ license and must apply for a GS license instead. This could occur, for example, if the building were primarily constructed of wood products, or an outdoor network with insufficient isolation is being operated on the property. In that case, it must use other, appropriately tailored harmful

[24] The expanded polygon area merely serves as an interference reference for future adjacent applicants, not as an expansion of the license area granted (which remains limited by the property boundary polygon). However, in some cases the expanded polygon area might include undeveloped land or an area unlikely to be licensed in the foreseeable future, and this could be a consideration in any license restrictions adopted.

interference measures relative to inbound and outbound harmful interference, in order to coordinate its frequencies and receive a license grant.

## V. Recommendations: The Commission can act to advance implementation quickly.

Questions about sharing in the lower 37 GHz band have been pending for two years, and no further details on future Federal usage has been provided in the interim. With the record now developed in the Third FNPRM, it is important for the Commission to expeditiously make certain defining decisions on the sharing framework foundation, and on user rights and obligations (including Federal users, in consultation with NTIA) so that this proceeding gains the focus necessary for developing the final implementation details along a clearly bounded path. With these pre-requisite decisions in place, we believe the proceeding could advance expeditiously. Further, we believe there is an early opportunity to begin issuing PZ licenses under certain restricted conditions – namely, for PZ licensees that meet PFD limits along the entirety of their property boundary polygon, which is a condition that can more easily be met for indoor systems.

**Specifically, we recommend that the Commission, in consultation with NTIA, expeditiously adopt an Order with the following limited scope, with the purpose of removing ambiguities that are forestalling the focused development and finalization of an actionable sharing regime:**

1. Federal and non-Federal users (with perhaps certain limited exceptions for Federal users) are co-equal, but this term is currently not well-defined. We believe co-equal sharing in this band necessarily means that Federal users have no superior priority or pre-emption privileges in this band. The result of the Commission and NTIA making this clarification is that no complex prioritization schemes and rules need to be debated and designed into the sharing framework.
2. Airborne/aerial use is not compatible with the desired operations and growth plans for this band and should be re-affirmed as an excluded use.
3. All Federal and non-Federal users are subject to an accommodation rule for next-in-time users. This is a simple, blanket obligation to accommodate next-in-time users to the extent feasible. Guidelines can (and perhaps should) exist alongside the accommodation rule (for example, channel-block sharing guidelines, frequency coordination negotiation guidelines) but those should not be made part of the Code of Federal Regulations, in order to avoid unintended consequences due to myriad deployment scenarios for this band.

4. Federal users should, as closely as is feasible, comply with the same technical rules as non-Federal users, so as to avoid the development of asymmetric technical analyses, frequency coordination, fairness, and enforcement rules.
5. Non-exclusive site licensees in this band are individual authorizations, rather than general authorizations. This means that individual licensees have both interference protection rights and obligations, including an up-front frequency coordination requirement, and including recognition that these rights and requirements dictate a form of non-exclusive license that permits location-specific limitations on the number of licensees in order to maintain predictable fairness and longer-term sustainability in this band. A comparable agreement from NTIA on behalf of Federal users is necessary unless Federal users will not seek to deploy in proximity to non-Federal users.
6. The Commission has sufficient information to state that the 70/80 GHz framework will serve as the sharing framework baseline going forward, for finalizing the Lower 37 GHz implementation rules. The proposal for using the 70/80 GHz framework as a baseline for the Lower 37 GHz sharing framework, with modifications to accommodate site licenses and frequency coordination, has been in the record for over two years. No substantive reasons not to use it have been proffered, nor has any comparably straightforward alternative, with as much potential to reuse proven work, been proposed. The selective use of Part 101 rules, as the Commission as proposed, is already accommodated in the 70/80 GHz framework. Further progress will remain stalled if this decision remains open-ended.
7. Site licensees in good standing should be guaranteed to retain access to no less than one 100 MHz channel block within the six available blocks in the band.
8. The Commission should either explicitly confirm that PZ licenses are a valid license category in this band, or explain why they are not. The proposal for licenses defined by a polygon representing the real property boundaries (which we are calling Property Zone, or PZ licenses) has been in the record for over two years. While we believe site licenses using the property boundary as the site boundary are implicitly allowed under the current rules, and make technical and operational sense in millimeter wave frequencies, and serve a justifiable need, no such license category has previously existed to our knowledge. We therefore ask that the Commission explicitly clarify their validity. Clarifying their validity does not preclude the development of specific guidelines to further refine their applicability and approval conditions in this band.

Once these rules and clarifications are in place, the numerous unresolvable “what if” scenarios that are hampering progress toward the engineering implementation of the sharing framework can be brought to closure. Focused and detailed proposals on the implementation process flow and the specific actions required of prospective licensees and of the coordination/registration system can proceed to be finalized.